

REMARKS

Claims 1-4, 6-11, and 14-23 are pending. Claims 1-2, 6, and 15-19 have been amended consistent with the informalities referenced in conjunction with objection to the claim format. These amendments do not alter the scope of the claims. Nor do the amendments alter the number of claims or types of claims. Thus, claims 1-4, 6-11, and 14-23 remain pending.

The Claim Objections

Claims 1, 15, and 19 were objected to based on a number of stated “informalities.” Specifically, the Examiner asserted that claim 1 fails to describe the variables utilized in equations i-iii. Claim 1 has been amended, without narrowing the scope of the claim, to include descriptions of those variables as set forth in the specification. Thus, this objection is believed to be overcome. Withdrawal of this objection is respectfully requested. In addition, amendments to include definitions of variables recited therein have been made to claims 16-18 in a similar manner as the amendments to claim 1. Further, an amendment has been made to claim 6 for clarifying antecedent basis based on the amendments to claim 1. All of these amendments are to the form of the claim – *i.e.*, they are definitional only – and do not substantively limit the scope of the claims.

In addition, the Examiner questioned whether the phrase “comprising the acts” should be replaced throughout claims 1, 15, and 19 with the phrase “comprising the steps.” Claims 1-2, 15, and 19 have been amended to replace references to “acts” with “steps.” Originally filed claim 8 already used the term “steps” instead of “acts” in referring to claim 1; therefore, claim 8 has not been amended. It is believed that this amendment is not necessary, but it is being made merely to expedite allowance of the pending claims as it does not narrow the scope of the claims. Thus, this objection is believed to be overcome. Withdrawal of this objection is respectfully requested.

In addition, the Examiner stated that the occurrence of “and” after “second state” in step d-ii of claim 15 must be deleted. Similarly, the Examiner stated that the occurrence of “and” after “set of equations” in step d-iv of claim 19 must be deleted. Applicant respectfully disagrees. Claims 15 and 19 have a combination of sub-elements and sub-sub-elements. The

term “and” is used in advance of the last sub-sub-element, and again in advance of the last sub-element in each claim. In any event, semicolons separating the sub-sub-elements have been replaced with commas in each of claims 15 and 19 to further distinguish between listing of sub-elements and sub-sub-elements. These amendments do not alter the scope of the claims in any way. Withdrawal of this objection is respectfully requested.

Further, the Examiner stated that the occurrence of “iv” after “then” in step d-iii of claim 19 must be deleted. Applicant agrees that this was a typographical oversight. Accordingly, claim 19 has been amended accordingly without altering the scope of the claim. Thus, withdrawal of this objection is respectfully requested as the objection is believed to be moot.

Finally, the Examiner stated that the recitation of “a second time” in line 2 of claim 19, step d-ii, must be replaced with the phrase “the second.” Throughout claims 15 and 19, the term “time” has been deleted for proper antecedent basis with the “second index” previously referenced in those claims. This amendment does not alter the scope of the claims. Withdrawal of this objection is respectfully requested as the objection is believed to be moot.

The 35 U.S.C. §112, Second Paragraph, Rejection

Claims 15 and 19 stand rejected under the second paragraph of 35 U.S.C. §112 as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicant regards as the invention. Applicant notes that, while the rejection is stated to be based on claims 15 and 19, reference is only made to claims 15 and 3 in setting forth the rejection. Thus, the inclusion of claim 19 as opposed to claim 3 is believed to be an error and claim 19 will not be specifically addressed below. Instead, claim 3 is discussed below in conjunction with the Examiner’s remarks with respect thereto.

Specifically, the Examiner states that there is no antecedent basis for the phrase “the second time” in line 2 of step d-ii recited in claim 15. As discussed in relation to the objection to claim 19 above, claim 15 has been amended to replace the phrase “the second time index” with “the second index” for proper antecedent basis. Thus, this rejection is believed to be moot. Withdrawal thereof with respect to claim 15 is respectfully requested.

Further, the Examiner states that the recitation of “wherein the communication system comprises” in claim 3 is not consistent with the method claim reciting method steps in terms of “comprising the steps of.” Applicant respectfully disagrees. Claim 1 recites: “A method of applying overlaid perturbation vectors for gradient feedback transmit antenna array adaptation in a communication system, wherein the communication system includes” Claim 3 is consistent with the language set forth in claim 1, including claim 1’s reference that “the communication system includes” There is proper antecedent basis for claim 3’s reference to the communication system. Withdrawal of this rejection is respectfully requested.

The 35 U.S.C. §101 Rejection

Claims 1-4, 6-11, and 14-23 stand rejected under 35 U.S.C. §101 as allegedly being directed to non-statutory subject matter. Applicant respectfully traverses this rejection and requests withdrawal thereof.

The Examiner alleges that the claims taken as a whole are “directed to an abstract idea, ‘recite steps using mathematical equations for performing an algorithmic mathematical computation of weight vectors and repeating steps a) through e) in an endless loop.’” In referencing the recent Interim Guidelines, the Examiner asserts that “for claims including such excluded subject matter to be eligible, the claim must be for a practical application of the abstract idea.” Then, the Examiner concludes that the “claim fails to provide a practical application of the abstract idea because the claimed invention does not transform an article or physical object to a different state or thing nor the claimed invention otherwise produces a useful, concrete, and tangible result. The claim only performs mathematical computation in an endless loop and no final result is achieved.” Applicant respectfully disagrees. In addition, while the Examiner refers to the recent Interim Guidelines (“the Guidelines”) in setting forth the rejection, Applicant notes that no explanation has been provided by the Examiner as to how the rejection could be overcome or the perceived problem resolved as suggested in Section II of the Guidelines.

Applicant respectfully submits that the claims as a whole satisfy the requirements of 35 U.S.C. §101. First, the claims are not merely directed to an “abstract idea.” The present

invention is directed toward a statutory process – a method of applying overlaid perturbation vectors for gradient feedback transmit antenna array adaptation in a communication system.

Claim 1, step (d) recites that a new weight vector perturbation vector is determined based on the feedback generated according to step (c) of the method. Upon returning to step (a) as set forth in step (e), that new weight vector perturbation vector is then overlaid according to steps recited in the method. While the method allows for continual operation of the communication system, that does not mean that no final result is achieved or no practical application exists. The desired result and practical application is evident by the efficient and improved gradient feedback transmit antenna array adaptation in accordance with the presently claimed methods.

As discussed on page nine of the originally filed specification:

The method and apparatus of the present invention allows a communication system to reduce transmit power that is associated with dedicated pilot signals by overlaying perturbation vectors and measuring channel estimates and demodulation channel estimates during a measurement time interval that comprises a plurality of feedback time intervals. The present inventive method utilizes channel estimates that include the effects of previous perturbation vectors, subsequent feedback vectors and intermediate feedback decisions. The inventive method extracts a coarse gradient estimate by utilizing a continuous summation of overlaid weight vector perturbation (OWVP) vectors and updates the weighting vector accordingly. In accordance with the present invention, receivers measure continuous summations of OWVP vectors.

The method and apparatus of the present invention improves the performance in a wireless communication system by reducing signal degradation and interference. Specifically, the present inventive method reduces the amount of transmit power or energy that is associated with a dedicated pilot of a communication system.

Indeed, Section II of the Guidelines recognizes that: “The applicant is in the best position to explain why an invention is believed useful.” The originally filed specification provided this explanation of usefulness throughout, including in the section on page nine referenced above.

It is believed that this rejection is improper in view of the specific, clear, and credible utility of the claimed invention, which is described throughout the specification. The claimed invention provides a useful, concrete, and tangible result. That result also involves a physical transformation as a new weight vector perturbation vector is determined based on feedback

generated according to the method. That new weight vector perturbation vector is then applied according to the method for gradient feedback transmit antenna array adaptation in a communication system. For several reasons, the claims as a whole satisfy the requirements of 35 U.S.C. §101. They define a statutory process as set forth in 35 U.S.C. §101.

Withdrawal of this rejection is respectfully requested. However, in the event that the Examiner maintains this rejection, an explanation as to how the rejection could be overcome or the perceived problem resolved is respectfully requested as suggested by the Guidelines. As Applicant believes that 35 U.S.C. §101 is indeed satisfied by the pending claims, such an explanation would be helpful in the event that this rejection is maintained.

Prior Art Not Relied Upon But Made of Record

The differences between the documents referenced on pages 4-5 of the Office Action are not discussed in this paper as none of these documents have been relied upon in rejecting any of the pending claims as being unpatentable. Applicant reserves the right, however, to provide detailed arguments in that regard should any of these documents be relied upon as supporting a position that the claims are unpatentable in the future.

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Conclusion

The amendments set forth herein are believed to place the application into condition for immediate allowance. As such, entry of these amendments and prompt allowance of all pending claims is respectfully requested.

The Commissioner is authorized to construe this paper as including a petition to extend the period for response by the number of months necessary to make this paper timely filed. Fees or deficiencies required to cause the response to be complete and timely filed may be charged, and any overpayments should be credited, to our Deposit Account No. 50-0490.

Respectfully submitted,

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